SUMMARY REPORT

WATER SYSTEM IMPROVEMENT PROGRAM AND MASTER PLAN

for the

CITY OF HELENA

APRIL, 1978

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INTRODUCTION

This document is a summary of the report entitled "Water System Improvement Program and Master Plan for the City of Helena" dated April, 1978. The purpose of this summary report is to condense the most relevent information, conclusions and recommendations from the detailed report into a shorter document for more convenient dissemination of the contents. For those interested in more information on the study, the detailed report is available for review at the office of the Director of Public Utilities, City of Helena.

The report is a result of a contract dated August 4, 1976, between the City of Helena and Morrison-Maierle-Montgomery, a Joint Venture of Morrison-Maierle, Inc. and James M. Montgomery, Consulting Engineers, Inc.

The purpose of this study is to determine the need for providing additional water supplies, better water treatment, improved water transmission capabilities, added water storage and an updated water distribution system to provide for both existing and future water demands in Helena.

STUDY AREA, POPULATION AND WATER DEMAND

Study Area

The study area for the investigation consists of the present water system service area, plus outlying areas which are considered potential service areas in the future. The study area boundaries are shown on Figure 7-5 at the end of this report.

Area Population

The study area population is projected for 5-year inclements between 1980 and 2000 based on information furnished by the City-County Planning Department and the Montana Department of Community Affairs. The population estimate in the study area is 30,500 for the year 1980 and 58,000 for the year 2000.

Water Demands

Projected water demands are based on historical per capita consumption and other water use data compiled from City records for the past several years. Records for 1976 indicate a total annual water consumption for the water service area of 2,318 million gallons with a maximum daily demand of 20 million gallons. Projected water demands for 1980 and 2000 are 2,746 and 4,204 million gallons annually and maximum day demands of 24 and 36 million gallons per day, respectively.

EXISTING WATER SYSTEM

The existing water supply for the City is derived from three independent sources of supply: Tenmile Creek, Missouri River and the Hale system.

Tenmile Supply

The Tenmile supply system is the largest source of supply and feeds the City from the Southwest through two 16-inch and one 24-inch supply lines from a settling basin near the Rimini turnoff on Highway 12. With existing collection, storage and supply facilities the Tenmile supply system has a dependable annual water supply of approximately 1,960 million gallons. Supply line capacities limit this source of supply to a maximum of about 14 million gallons per day.

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Missouri River Supply

The Missouri River water supply is treated and filtered at a Water Treatment Plant located near Prickley Pear Creek about 2 miles northeast of the City. Water is obtained from the U.S. Bureau of Reclamation Regulating Reservoir through a 30-inch gravity pipeline. Treated water from the plant is pumped to the City through a 24-inch supply main. The water plant has a maximum capacity of approximately 6 million gallons per day.

Hale Groundwater Supply

The Hale supply consists of two independent groundwater sources. One source is an infiltration gallery located about 3.5 miles up Oro Fino Gulch. The other groundwater source is part of the historic Bedrock System which is collected and pumped to the Hale Reservoir through the Eureka Well Pump Station located on Upper Last Chance Gulch. The Hale Supply System, including the Eureka Well, has a maximum capacity of approximately 2 million gallons per day.

Water Quality

Water quality of all the water supplies is generally very good. A treatment plant will be required on the Tenmile supply in order to bring the turbidity within limitations of the Safe Drinking Water Act (PL 93-523). All supplies were tested for chemical constituents, heavy metals, and radiological activity. All concentrations are far below established limits as determined by the Safe Drinking Water Act.

Pressure Zones & Reservoirs

Due to extreme differences in elevation within the water service area, the water distribution system is divided into several pressure zones. The Malben-Woolston system is the largest service zone, serving the majority of the City users. Recent installation of pressure reducing valves on feeder lines to the area north of the railroad tracks has further subdivided the Malben-Woolston system into an upper zone and lower zone. The pressure reducing valves lower the pressure in the lower zone by 70 to 80 psi. Three reservoirs are located so as to float on the upper zone of the Malben-Woolston system, all with high water elevations near 4320. Two reservoirs, known as the Woolston Reservoirs, are located on the West Side of the City and have a combined capacity of 6.2 million gallons. The third reservoir with a capacity of 4.0 million gallons, is located near the south end of Montana Avenue and is known as the Malben Reservoir.

Hale High Level System

The Hale distribution system comprises less than 5% of the existing distribution system. This service zone serves the higher elevation area on the south edge of the City east of Last Chance Gulch. The distribution system is fed from the Hale Reservoir which has a high water elevation of approximately 4370. The reservoir, constructed in the 1880's, is a masonry wall, open top tank with a capacity of about 2.2 million gallons.

Winne High Level System

The Winne distribution system serves the higher elevation area in the southeast portion of the City. Water is supplied to this system by the Dalhausen pump station located adjacent to the Malben Reservoir. Winne Reservoir No. 1, a 500,000 gallon steel reservoir floats on the system and has a high water elevation of 4502.

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ALTERNATE SOURCES OF SUPPLY

Alternate sources of supply were investigated to provide (1) the total annual supply and (2) the maximum daily demand, for the projected needs to the year 2000.

Tenmile Potential for Added Development

A number of alternatives were evaluated on the Tenmile supply to increase the annual yield from this source. These alternatives include the addition of a 1000 acre-foot reservoir on Travis Creek, a 1000 acre-foot reservoir on Upper Tenmile, a 2000 acre-foot reservoir on Upper Tenmile, enclosing the Red Mountain Canal, a new diversion from Park Lake, purchase of existing Tenmile water rights, addition of Walker Creek Supply, and increasing the capacity of the Tenmile intake and supply system to the settling basin. The cost of each alternative was evaluated on the cost per million gallon increase in yield and compared to costs of producing the same million gallons from the Missouri River supply. Of the various development alternatives for increasing annual yield, only the addition of the Walker Creek Supply is economically feasible.

Water Treatment for Tenmile Supply

Several alternate treatment processes were evaluated for the Tenmile supply. These included (1) In-Line Filtration, (2) Direct Filtration, (3) Shallow-Bed/Automatic Backwash, (4) Pressure Filtration and (5) Conventional High-Rate Gravity Filtration. The quality of the raw water and the extreme fluctuations in the water quality, led to the recommendation of the conventional high-rate gravity filtration system for the Tenmile supply. This system consists of a pretreatment process, final filtration and chlorination. The pretreatment process includes chemical addition, mixing, flocculation and sedimentation for preconditioning the water for filtration.

Cost of Alternative Water Sources

All potential sources of water supply in the Helena area were studied as a means of providing future supplies to the City of Helena to satisfy projected water demands. In addition to the existing Tenmile, Missouri River and Hale supplies, studies were made on Trout Creek, McClellan Creek and groundwater sources. Results of the evaluation showed the existing Hale System to be the most economical supply, followed by the combined Tenmile/Missouri River system.

Tenmile/Missouri River Supply Alternatives

In order to determine the most cost-effective arrangement of required facilities in the Tenmile/Missouri River System, a series of alternatives was established to evaluate both the capital investment and annual O&M cost of developing the system to its required level. The alternatives were based on a total annual city demand in the year 2000 of 4,204 million gallons and a maximum day flow rate of 36 million gallons per day. The Hale/Eureka system was determined to be capable of contributing about 462 million gallons per year and a maximum daily flow of 2 million gallons per day. Based on this projected Hale/Eureka supply, the Tenmile/Missouri River system must be capable of supplying a maximum daily flow of 34 million gallons per day to satisfy the demands in the year 2000. The four alternatives evaluated are presented below.

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SUPPLY CAPACITY FOR TENMILE & MISSOURI RIVER WATER SUPPLY ALTERNATIVES

	Tenmile	Missouri River	Total
Alternative I	10 mgd	24 mgd	34 mgd
Alternative II	20 mgd	14 mgd	34 mgd
Alternative III	14.8 mgd*	19.2 mgd	34 mgd
Alternative IV	22 mgd	12 mgd	34 mgd

*Approximate capacity of the existing Tenmile supply lines from the Settling Basin to the City.

Water System Improvements Required

Water supply improvements required under each alternative include (1) a new water treatment plant on the Tenmile supply, (2) new water supply line to the Tenmile treatment plant, (3) new treated water supply line from the Tenmile Plant to the City, (4) expansion of the present 6 mgd Missouri River Plant, (5) new water supply line from the USBR Regulating Reservoir to the Missouri River Plant, (6) new treated water supply line from the Missouri Plant to the City and (7) Missouri River Plant Pump Station to pump the water to the City. Total costs of all the improvements required to satisfy the year 2000 demands, ranged from a low of about $15.2 million for Alternative IV to a high of $19.9 million for the most costly Alternative III.

Alternate IV the Most Economical

The results of the analysis show Alternative IV to be clearly the most economical based on both capital cost and annual cost evaluations. The capital cost of $15.2 million is about 20 percent lower than the next low Alternative I. Annual cost evaluations included costs for raw water, chemicals, power, labor and capital amortization. The annual costs for Alternative IV averaged about 17 percent lower than the next-ranking Alternative I for the study period.

Groundwater – A Source for Added Study

A brief groundwater study was undertaken to determine the possibility of developing additional city water supplies from water wells in the Helena Valley. Information compiled and evaluated in this investigation indicates that a source of groundwater capable of yielding up to 1000 gpm or more to individual water wells is present in the central portion of the Helena Valley. However, uncertainties regarding groundwater development for municipal supplies in this area result from the current lack of groundwater data from which to develop analyses evaluating potential impacts on the groundwater system and future use and availability of groundwater in the Helena Valley. A 16-inch screened test well located near the Missouri River water plant yielded a firm supply of 600 gpm. More detailed studies are necessary on groundwater withdrawals to determine the potential impact of municipal pumping on other current and future groundwater uses.

Alternatives too Costly for Consideration

Other alternative surface water supplies evaluated in this study included McClellan Creek, Trout Creek and Beaver Creek. The costs of developing and treating each of these supplies far exceeds the costs of developing increased supplies from the Tenmile and Missouri River systems.

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Alternatives too Costly for Consideration

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Annual Costs of Water Supplies

For comparative purposes, the combined annual capital recovery and annual operation and maintenance costs are presented as a cost per million gallons of water required to develop, treat and deliver each supply to the City.

ALTERNATIVE SOURCES OF SUPPLY — ANNUAL COST COMPARISON

Source	Cost Per Million Gallons
Tenmile/Missouri River System	
Alternative I	$ 612
Alternative II	616
Alternative III	648
Alternative IV	522
Hale System	113
Helena Valley Groundwater	N/A
McClellan Creek	5,357
Trout Creek	917-955
Beaver Creek	5,500
Additional Tenmile Improvements	
Red Mountain Canal	1,728
Travis Creek Reservoir	1,300
Upper Tenmile Reservoir	1,908

The above costs are based on the water demand for the year 2000 and an Engineering News Record Construction Cost Index of 2500.

STORAGE AND DISTRIBUTION SYSTEM ANALYSIS

The Helena water distribution system serves areas from a low elevation of 3800 to a high elevation of about 4400 feet. The system is divided into three principle service zones: (1) the Malben-Woolston service zone (2) The Hale service zone and (3) the Winne service zone. A computer analysis was performed on each existing service zone to determine the deficiencies within each system in terms of supplying normal domestic needs, irrigation and supplying adequate amounts of water for fire protection. Distribution deficiencies for ultimate development of each service zone were identified.

Distribution System Expansion into the Valley

The distribution systems were also evaluated for serving future expansions of the water service area. The area within the study boundary and north of Custer Avenue constitutes a future service zone known as the Valley Zone. The major distribution grid is presented in the detailed report to provide for ultimate development of this area.

Upper & Lower Zones in Malben-Woolston System

The Malben-Woolston distribution system has been divided into two zones due to the extreme elevation differences within the system. The area north of the railroad tracks and west of Interstate Highway 15 is separated from the balance of the Malben-Woolsten system by pressure reducing valves and is referred to as the "Lower Zone". Water supply to the lower zone is presently a very inefficient process, particularly during periods when water is supplied from the Missouri River Plant. Water from the Missouri Plant is pumped at a pres-

sure of 250 to 280 psi to feed the Malben Reservoir and upper zone. The same water is then reduced by 70-80 psi when fed to the lower zone. It is proposed that the Lower Zone of the Malben-Woolston System be incorporated as a part of the future valley system to make the best use of energy for water supply.

Storage Components are Important in System Analysis

Storage of treated water in distribution systems eliminates the need to oversize the treatment plants, booster pump stations and transmission mains to handle peak hour and fire flow demands. Storage requirements for each of the pressure zones were analyzed individually. Components considered in determining storage required within the system included: (1) Operational Storage, (2) Fire Storage and (3) Emergency Storage.

All service zones except for the Hale service zone, are deficient in storage even for present needs. A total of approximately 22 million gallons of storage is required to be added to the various service zones between the present time and the year 2000.

Added High Elevation Zones Needed in Future

High elevation systems consisting of a booster pump and storage reservoir will be required when development occurs on the higher elevation slopes south of Helena. Two will be included in the Hale System Service Area (Mount Ascension and South Rodney High Elevation areas) and one in the Upper West Side of Helena. Proposed pump stations, supply lines and reservoirs are presented to serve these high elevation areas.

RECOMMENDED IMPROVEMENT PROGRAM

Recommended improvements to the Helena Water System to the year 2000 are shown on Figures 7-4 and 7-5 at the end of this report. A projected schedule for implementing the capital improvements program is shown in Table 7-4. Cost estimates of the improvements are based on January, 1978 ENR of 2500. Each improvement is assigned a date for implementation based on projected growth and certain assumptions discussed in the following summary.

- ***Hale Reservoir Cover & Repairs — $313,000***

  A cover for the Hale Reservoir is one of the City's most urgent needs on the water system and construction should be scheduled as soon as possible. A total of $142,847 toward the cost of the Hale Reservoir work has been included in the City's Fourth Year Community Development Grant from the Department of Housing and Urban Development.

- ***Hale Supply Improvements — $100,000***

  Improvements to the Oro Fino Gulch supply line and to the Eureka Well are scheduled for 1978. The fact that these improvements will increase the reliability of this supply, makes this a high priority item.

- ***Walker Creek Intake Improvements — $5,000***

  Reactivating the Walker Creek intake was accomplished by the City in 1977. Additional improvements scheduled for 1978 will increase the total supply capability of the Tenmile system.

TABLE 7-4

Const. Cost Index = 2500
January, 1978

HELENA WATER IMPROVEMENT PROGRAM
IMPLEMENTATION AND PRIORITY SCHEDULE

COST IN $1,000

	1978	1979	1980	1981	1982	1983	1984	1985	1990	1995	
Distribution											
Water Mains	450	450	450								
Fire Hydrant Additions			170								
Winne Pump Station									(150)		
Tenmile											
Walker Creek Intake	5										
Water Treatment Plant Phase I = 11 MGD			5,000								
Water Treatment Plant Phase II = 11 MGD								"3,400"			
Raw Water Supply Line								"1,994"			
Finished Water Supply Line (Hiway R/W) Phase I		1,195									
Finished Water Supply Line (Non-Hiway) Phase II								"939"			
Missouri River											
Water Treatment Expansion				1,510							
Finished Water Supply Line Phase I				904							
Finished Water Supply Line Phase II							"1,266"				
Hale Supply											
Reservoir Cover & Repairs	313										
Orofino Gulch Supply Line Imp.	75										
Eureka Well Repairs & Imp.	25										
Storage											
Winne Reservoir #2 0.5 MG		(210)									
Winne Reservoir #3 2.0 MG						(525)					
Winne Reservoir Supply Line						(100)					
Winne Reservoir #4 2.0 MG										(525)	
Malben Woolston 5.0 MG					965						
Valley Reservoir #1 6.0 MG							"1,090"				
Valley Reservoir #2 6.0 MG										"1,090"	
Upper Westside 0.4 MG & Supply		(281)									
South Rodney 0.2 MG & Supply						(147)					
Mount Ascension 0.35 MG & Supply			(331)								
Telemetering & Controls											
Missouri River Plant				46							
Telemetry System				23							
Future Operations Center				10							
City Financing	868	1,645	5,620	2,493	965						11,591
Private or Spec. District Financing		(491)	(331)			(772)			(150)	(525)	(2,269)
Financing Related to Valley Annexation							"2,356"	"6,333"		"1,090"	"9,779"
TOTAL	868	2,136	5,951	2,493	965	772	2,356	6,333	150	1,615	23,639

- ***Distribution System Improvements — $1,350,000***

  Improvements to the distribution system consist of new water main additions to strengthen the distribution grid in several areas to correct deficiencies, maximize distribution efficiency, provide adequate fire flows and to provide for future expansion. Construction of these improvements are proposed over a three year period, beginning in 1978.

- ***Fire Hydrant Additions — $170,000***

  Approximately 87 new fire hydrants are needed in the existing water distribution system to bring the City into compliance with current minimum spacing requirements. These hydrant additions are proposed for the same time period as the water distribution system improvements.

- ***Tenmile Water Treatment Plant. Phase 1 — $5,000,000, Phase 2 — $3,400,000.***

  The 22 mgd Tenmile Plant is recommended for two phases of construction, each at a capacity of 11 mgd. The first phase would be constructed as soon as practical in order to bring this supply into compliance with drinking water standards. The second phase would be added when the demand for additional water dictates, projected for about 1985.

- ***Tenmile Raw Water Supply Line — $1,994,000***

  The construction of this new raw water supply line will increase the capacity from the Tenmile intakes to the settling basin to 22 mgd. This must be achieved at the same time that the Phase II Tenmile Water Plant is constructed in order to provide the 22 mgd supply to the expanded plant.

- ***Tenmile Finished Water Supply Line.***
  Phase 1 — $1,195,000, Phase 2 — $939,000.

  The finished water supply line from the Tenmile supply is also recommended to be constructed in two phases. The Phase I work is for that portion within highway right-of-way and its schedule will be dictated by proposed reconstruction of the highway from Broadwater to the Rimini Road. The first highway contract for this reach is scheduled for letting in 1979 or 1980. The second phase of the supply line involves that portion outside the highway right-of-way and is scheduled for construction at the same time as Phase II of the Tenmile Water Plant, or about 1985.

- ***Missouri River Water Treatment Plant Expansion — $1,510,000***

  The expansion of the Missouri River Plant from 6 mgd to 12 mgd capacity is recommended in the year 1981. It is projected that the population growth in the system at this point in time will necessitate the addition of the 6 mgd to meet the maximum daily water demands.

- ***Missouri River Finished Water Supply Line, Phase 1 — $904,000***

  This additional supply line from the Missouri River Plant to the intersection of Custer and Montana Avenues must be constructed at the same time the plant is expanded. This supply line is necessary to provide the transmission capability for the increased plant supply.

- ### *Telemetering and Controls — $79,000*

  The completion of the improvements to the telemetering and control systems would logically be scheduled with the Missouri River Treatment Plant Expansion in 1981.

- ### *0.5 MG Winne Reservoir No. 2 — $210,000*

  The lack of adequate storage capacity in the rapidly growing Winne Zone dictates that the construction of this reservoir should be considered in the near future.

- ### *2.0 MG Winne Reservoirs Nos. 3 and 4 — $525,000 Each*

  The construction of these additional two reservoirs will be determined by the rate of growth in the Winne Service Zone. When the population in this zone reaches 2500 to 3000 people (projected in 1983) the No. 3 Reservoir should be considered for construction. The No. 4 unit should be scheduled when the population reaches 4500 to 5000 people, projected for about 1995.

- ### *Winne Reservoir Supply Line — $100,000*

  The new supply line to serve Winne Reservoirs 3 and 4 must be constructed at the same time as the No. 3 Reservoir.

- ### *Winne Pump Station and Feeder Line — $150,000*

  The second pump station supplying water to the Winne Zone should be scheduled for construction when the maximum daily demand in this zone reaches about 2.2 mgd. This is projected to occur when the population in the service zone reaches about 3500 people, estimated about the year 1990.

- ### *6.0 MG Valley Reservoirs Nos. 1 and 2 — $1,090,000 Each*

  The construction of the two Valley Reservoirs will be determined by the annexation of the Valley Service Zone and the rate of growth in this area. The initial 6.0 MG Reservoir would be constructed when the distribution system expands north of Custer Avenue. It is difficult to predict when this may occur since so many different factors will influence this happening. For the purposes of this study, the initial reservoir is projected for the year 1984. The second reservoir should be considered for construction when the Valley Zone and Lower Malben-Woolston Zone reach a population of about 13,000 to 14,000 people, projected for about 1995.

- ### *Missouri River Finished Water Supply Line, Phase 2 — $1,266,000*

  This phase of the Missouri River Supply Line is an extension of the supply line from the intersection of Custer and Montana Avenues to the new Valley reservoirs. This supply line may be extended as the service area expands to the Valley, but completion of the line to the reservoir site must be scheduled with the construction of the Valley Reservoir No. 1.

- ### *5.0 MG Malben-Woolston Reservoir — $965,000*

  Construction of this reservoir should be scheduled within the next few years to reduce the existing storage deficiencies in the Malben-Woolston system. However, in the list of priorities, this improvement would follow the expansion of the Missouri River Plant. Consequently, this reservoir is projected for about 1982.

- *High Elevation Supply and Storage Systems*

Upper Westside	0.45 MG Storage and Supply —	$281,000
Mount Ascension	0.35 MG Storage and Supply —	331,000
South Rodney	0.20 MG Storage and Supply —	147,000

The implementation schedule for these improvements will be determined by the rate of development of the specific high elevation service areas. Arbitrary dates of 1979 for the Upper Westside, 1980 for Mount Ascension and 1983 for South Rodney have been selected as being reasonable for implementing these improvements.

POTENTIAL SOURCES OF FUNDS FOR WATER IMPROVEMENTS

Financial arrangements for the capital improvements are expected to be divided into three categories.

- *City Financing*

This financing would be the general responsibility of the City for improvements to the existing water system or for improvements for increased supply, distribution and storage for increased water demands within the present service area of the water system.

- *Private or Special District Financing*

This financing would relate to improvements for developing water supply, distribution or storage which will serve specific areas, districts or service zones which are peculiar to the basic water system. The high elevation zones are included in this category. In some cases, this financing will be provided by a private developer and in other cases, it may be special district financing for the specific area benefiting from the improvements.

- *Future Annexation Financing*

This financing would be related to those improvements for additional supply, storage and distribution to serve new expansion areas of the water service area. This method of financing may be through special assessments on annexed areas, Special Improvement Districts or through some type of connection fee for new customers in these areas.

FINANCIAL PLANNING FOR WATER FACILITIES

Present Deficit

The City of Helena Water Department has experienced four consecutive annual operating deficits with the accumulated total deficit expected to reach $353,000 by June 30th, 1978.

Immediate Water Revenue Needs

With a five-year retirement program of the accumulated deficits and using an 8.5% annual escalation of operating costs, the annual water revenue for the next five years will need to average about $1,090,000 per year. This compares to the current year estimated water sales receipts of $770,000, and the projected receipts of $781,000 per year with the rate structure approved by the Public Service Commission in April, 1978. The $1,090,000 annual

water sales revenue requirement does not include funds for the recommended capital facilities program or related debt service, or increased operation and maintenance expense resulting from the recommended capital improvement program. Even with the recent rate increase, Helena's water revenue will not meet its needs.

Finance With Bonds and Pay-As-You-Go in Near Future

Financing for capital improvements may be available from the Federal Government through grants or loans, from the private sector, or from the public served. The City should not plan to rely upon Federal grant programs to meet its capital financing requirements over the next few years; however, advantage should be taken of every opportunity to obtain such funding. It would appear that issuance of bonds for all major projects along with some combination of "pay-as-you-go" for small projects, would be a prudent consideration for the near future.

Desired Capital Improvements Plan will be Slowed by Potential Income

Escalating the 1978 costs of the capital improvement in the recommended priority schedule, results in a capital expenditure of approximately $14.6 million in the next five years as shown in Table 8-4. This represents only those improvements considered for City Financing. Although this schedule represents an ideal capital program from a technical point of view, it does not appear to be completely realistic from a financial point of view. This judgment is based on the existing financial condition of the Helena water system and the inability to obtain authority from the Public Service Commission for adequate current needs. The debt service for the $14.6 million five-year improvement program plus operating revenue requirements would result in a required revenue increase of 225% over current year estimated water sales receipts of $770,000.

Reappraisal of Capital Needs as Influenced by Financial Ability

The dilemma which must be faced when physical needs are in conflict with financial reality, is a reappraisal of priorities. The most acceptable alternative from a technical point of view, is to slip a portion of the proposed construction into a second five year capital program. Table 8-5 shows the remaining portion of the improvements in the first five year program which are considered immediately essential. These improvements include water distribution system improvements, fire hydrant additions, Walker Creek intake modifications, Hale Reservoir cover and repairs, Hale supply line and Eureka Well improvements, a new 11 mgd water treatment plant on the Tenmile supply and Phase I of the new finished water supply from Tenmile to the City. These improvements will require nearly $10 million in the five year period.

Reduced Five Year Program

Assuming that some of the improvements will be funded on a "pay-as-you-go" basis, a $9.5 million bond issue is anticipated over the 5 year period. Table 8-6 shows a bond repayment schedule for a $9.5 million bond issue. Based on projected revenue requirements for operation and maintenance plus the additional debt service for the $9.5 million issue, the average annual water revenue (or other revenue) required over the next five years would be about $1,616,000 or an increase of 110% over the current year estimated water sales receipts of $770,000.

TABLE 8-4

HELENA WATER IMPROVEMENT PROGRAM
PRIORITY SCHEDULE AND COSTS (1)
($1,000)

Project Items	1979 First Year	1980 Second Year	1981 Third Year	1982 Fourth Year	1983 Fifth Year
Distribution System					
Water Mains	486	525	566		
Fire Hydrant Additions			214		
Source of Supply					
Walker Creek Intake	5				
Treatment Plant (Phase I - 11 MGD)			6,300		
Finished Water Line		1,393			
Mo. River Treatment (Expns.)				2,054	
Finished Water Line				1,230	
Hale Supply					
Res. Cover & Repair	184				
Supply Line & Eureka Well Repairs	108				
Storage					
Malben-Woolston - 5 MG					1,418
Telemetry & Controls					
Mo. River Plant				63	
Telemetry System				81	
Operations Center				14	
Total	783	1,918	7,080	3,442	1,418 = $14,641,000

(1) The schedule of improvements shown in this table is advanced one year from that shown in Table 7-4 to allow time for arranging the financing for the improvements. Cost estimates are escalated to the corresponding year shown.

TABLE 8-5

HELENA WATER IMPROVEMENT PROGRAM
PRIORITY SCHEDULE AND COST
($1,000)

Project Items	1979 First Year	1980 Second Year	1981 Third Year	1982 Fourth Year	1983 Fifth Year
Distribution System					
Water Mains	292	315	340	367	397
Fire Hydrant Additions	37	40	43	46	50
Source of Supply					
Walker Creek Intake	5				
Treatment Plant (Phase I - 11 MGD)			6,300		
Finished Water Line		1,393			
Hale Supply					
Res. Cover & Repair	184				
Supply Line & Eureka Well Repairs	108				
Total	626	1,748	6,683	413	447 =
					$9,917,000

TABLE 8-6

HELENA WATER SYSTEM
TOTAL ESTIMATED DEBT SERVICE
(New Issues of $9,500,000)

Year	Principal Outstanding	Interest Payable @ 6.25%	New Issue Principle Maturing	Existing Debt Service Total Requirements	Total Debt Service Requirements
1	$3,500,000	$218,750	$ -0-	$142,560	$361,310
2	3,500,000	218,750	55,000	144,730	418,480
3	9,445,000[a]	590,313	70,000	141,750	802,063
4	9,375,000	585,938	160,000	143,680	889,618
5	9,215,000	575,938	190,000	143,080	909,018
6	9,025,000	564,063	210,000	142,200	916,263
7	8,815,000	550,938	210,000	146,040	906,978
8	8,605,000	537,813	240,000	144,320	922,133
9	8,365,000	522,813	255,000	147,320	925,133
10	8,110,000	506,875	255,000	89,760	851,635
11	7,855,000	490,938	285,000		775,938
12	7,570,000	473,125	305,000		778,125
13	7,265,000	454,063	305,000		759,063
14	6,960,000	435,000	350,000		785,000
15	6,610,000	413,125	350,000		763,125
16	6,260,000	391,250	400,000		791,250
17	5,860,000	366,250	415,000		781,250
18	5,445,000	340,313	445,000		785,313
19	5,000,000	312,500	495,000		807,500
20	4,505,000	281,563	510,000		791,563
21	3,995,000	249,688	540,000		789,688
22	3,455,000	215,938	590,000		805,938
23	2,865,000	179,063	605,000		784,063
24	2,260,000	141,250	655,000		796,250
25	1,605,000	100,313	675,000		775,313
26	930,000	58,125	450,000		508,125
27	480,000	30,000	480,000		510,000
TOTALS		$9,804,695	$9,500,000	$1,385,440	$20,690,135

(a) New Issue of $6,000,000 begins

RECOMMENDATIONS

Five Year Program of $9.9 Million Recommended

In order to provide for an adequate water supply for present and future needs that will meet the water quality standards of the State of Montana and the Drinking Water Standards of the Environmental Protection Agency, it is recommended that a capital improvements program be adopted as presented herein. It is recommended that the 5-year financial program as presented in Table 8-5 be initiated at an early date to provide adequate time for project planning and design.

Increased Water Revenue will Require Higher Rates

Since the financial program will be dependent upon a sound water rate structure to provide the necessary revenue, it is recommended that a comprehensive review be undertaken of the existing rate structure and a detailed study made on a new rate structure with proper allocations of cost to those benefited in proporton to the benefits received. The new rate schedule should then be submitted to the Public Service Commission along with the necessary backup data for their review and approval.

Better Utilization of Water through Conservation

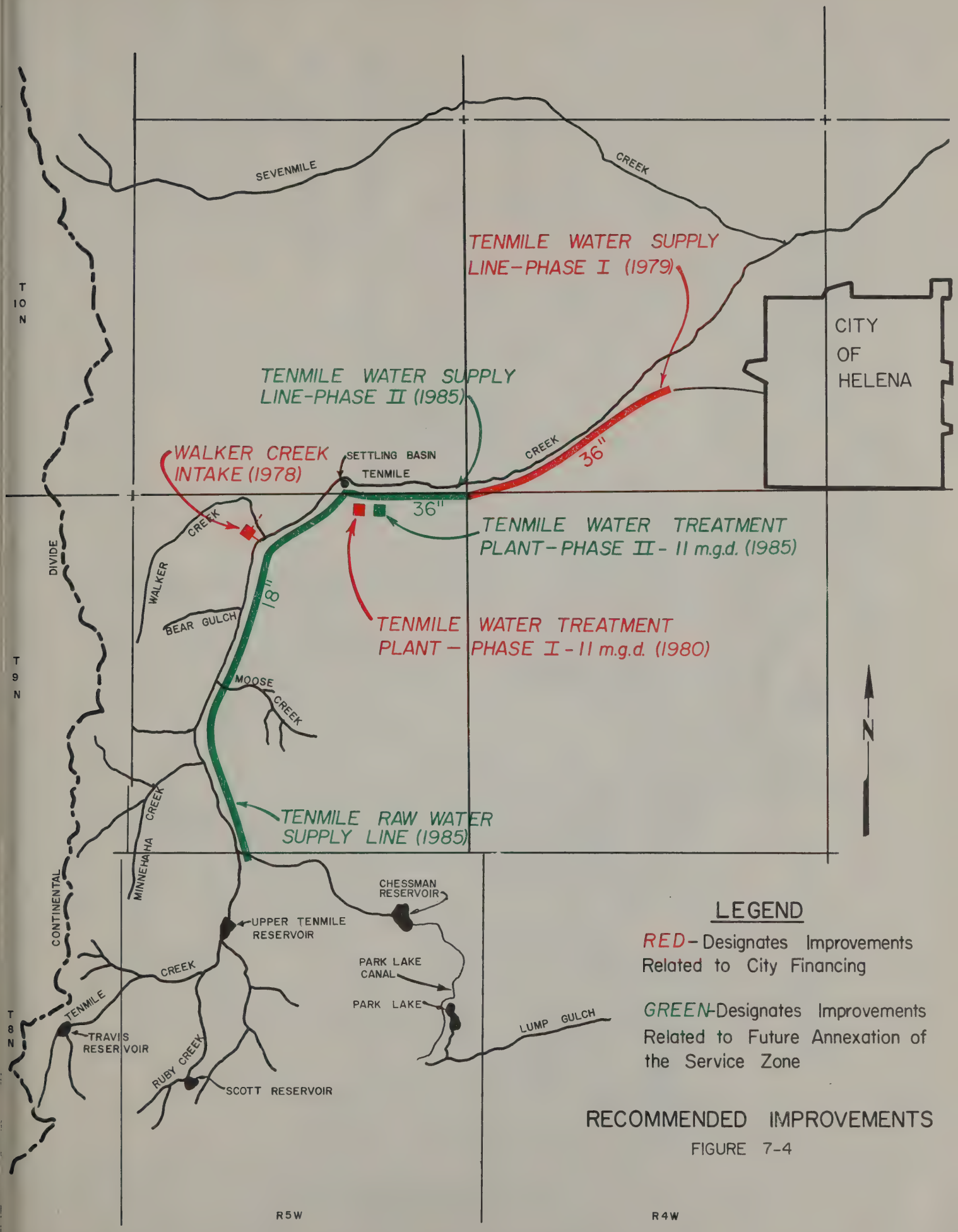
At the same time that the water supply needs are being presented to the people of Helena, it is recommended that a water conservation program be adopted to educate the water users in the various ways and means of conserving water.

Full Accountability for Water Use Needed

It is recommended that the City enact a stronger policy in the accountability of water used. This would include a program of metering all water supplied and distributed within the system, including water used by various City Departments.

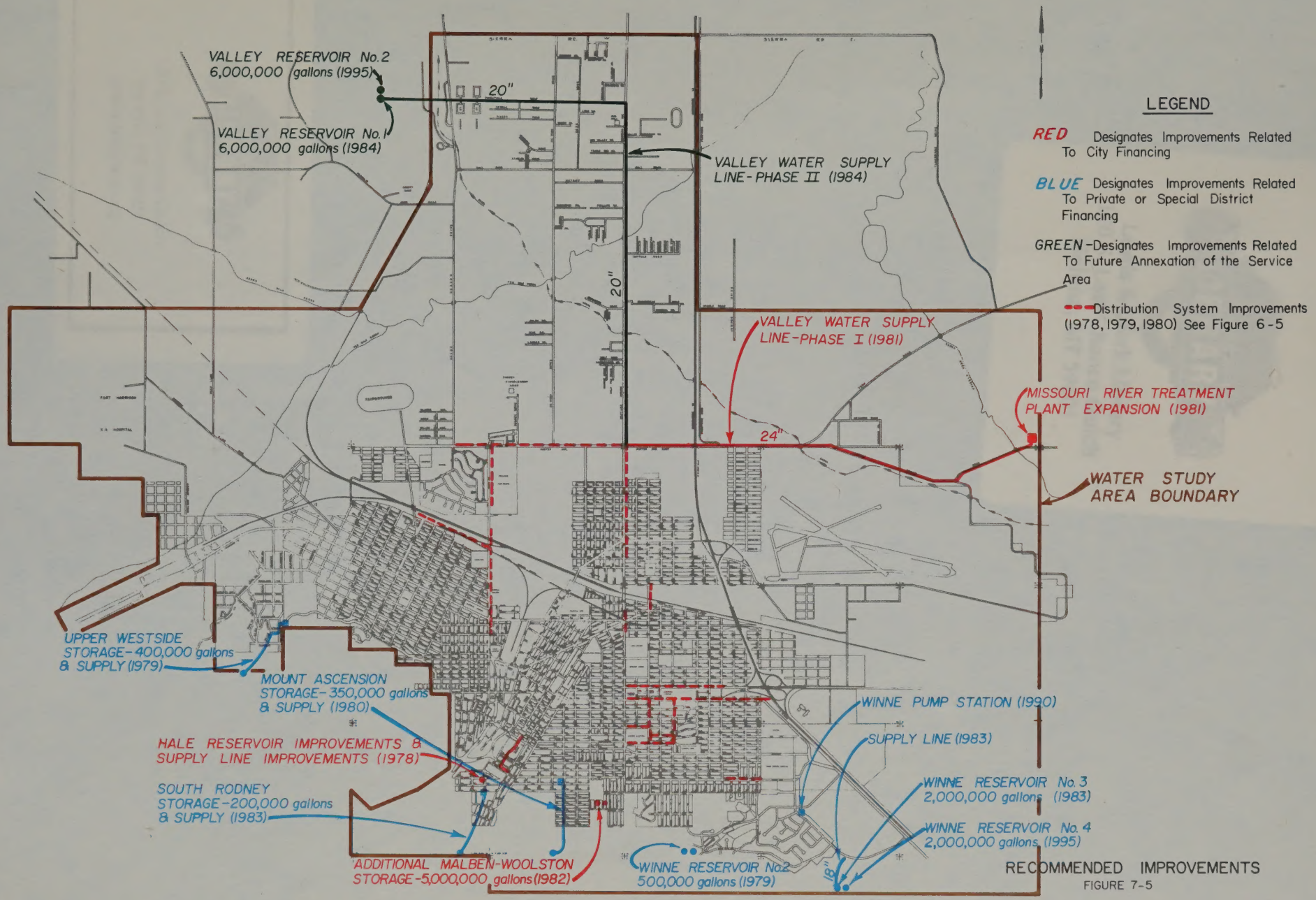
Eliminate Water Losses so far as Practical

Since the cost of water is becoming increasingly sensitive to its availability, it is recommended that the City exercise all efforts to eliminate water losses within the system. This would include losses within the distribution system through a continuous program of water main replacement and elimination of reservoir overflow losses through proper control systems.



RECOMMENDED IMPROVEMENTS

FIGURE 7-4



RECOMMENDED IMPROVEMENTS
FIGURE 7-5

LEWIS & CLARK
LIBRARY
FOUNDED 1898
Lewis & Clark Library
120 S. Last Chance Gulch
Helena, MT 59601

LEWIS & CLARK
LIBRARY
120 S Last Chance Gulch
Helena, MT 59601
www.lclibrary.org

Montana State Library
3 0864 1007 0453 8